WHAT IS CLAIMED IS:

1. A sliding structure for an automotive engine, comprising:

a sliding member being one selected from the group consisting of a piston ring, a piston pin, a cam lobe, a cam journal, a plain bearing, a rotary vane and a timing chain, and including a sliding portion; and

a lubricant applied to the sliding portion so that the sliding portion can make sliding contact with a counterpart member via the lubricant,

wherein the sliding portion has a base made of either a steel material or an aluminum material and a hard carbon film formed on the base to coat the sliding portion, and the hard carbon film has a thickness of 0.3 to 2.0 μm, a Knoop hardness of 1500 to 4500 kg/mm^2, a surface roughness Ry (μm) satisfying the following equation:

$$Ry < \{(0.75 - Hk/8000) \times h + 0.07/0.8\}$$

where h is the thickness (μm) of the hard carbon film; and Hk is the Knoop hardness (kg/mm^2) of the hard carbon film.

2. A sliding structure according to Claim 1, wherein the hard carbon film is a diamond-like carbon film formed by arc ion plating.

3. A sliding structure according to Claim 1, wherein the base has a surface roughness Ra of 0.03 μm or smaller.

4. A sliding structure according to Claim 1, wherein sliding portion coated with the hard carbon film has a convexity of which maximum height is 0.3 μm or smaller.

5. A sliding structure according to Claim 1, wherein the lubricant comprises a base oil having a kinematic viscosity of 2 to 8 m^2/s at 100°C and a viscosity index of 80 or higher.

6. A sliding structure according to Claim 1, wherein the lubricant comprises at least one additive selected from the group consisting of an anti-wear agent, a detergent dispersant, a viscosity index improver, a friction modifier, an anti-forming agent, a pour-point depressant, a rust inhibitor and an antioxidant.